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## DARWIN'S IDEA OF MENTAL DEVELOPMENT.

By MARION HAMILTON CARTER.

### INTRODUCTION.

In surveying the rise and progress of the Idea of Evolution, particularly since the publication of Darwin's "Origin of Species," in 1859, one can but be struck with its increasingly wide application to the interpretation of phenomena in every field of human inquiry. Starting with organic forms it has spread over both the world of living matter and the world of dead. Nay, more, it is now made to cover the facts of consciousness, and to serve as an explanation of the peculiarities of mind as well as of those of structure. Existence has come to be regarded, not as a bare fact, but as a continuing process in which there are known or determinable conditions followed by known or determinable results.

That the general concept of Evolution had been widely entertained previous to Darwin's day is beyond dispute, but it is to Darwin that we owe the definite and concrete form in which it has become potent in many new fields of investigation.

Inseparably bound up with the idea of organic evolution is the idea of mental evolution. *That* mind evolves seems to have been self-evident to Darwin, the case being granted at once upon its merits, and nowhere do we find him questioning it; *how* mind evolves he devoted a not inconsiderable portion of his work to showing; but he seems to have rested his problem on that assumption, for he tells us that "I have nothing to do with the origin of the mental powers, any more than I have with life itself. We are concerned only with the diversities of instinct and of the other mental faculties of animals of the same class."<sup>1</sup> And again, with regard to sensation, he says, "How a nerve comes to be sensitive to light hardly concerns us more than how life itself originated."<sup>2</sup>

Darwin accepted mind, as he accepted life itself, as part and parcel of his scheme of organic evolution; and he thought widely, though not deeply, upon it. He was emphatically neither psychologist nor metaphysician, and writes somewhat naively to John Fiske, of the "Outlines of Cosmic Philosophy:" "I have long wished to know something about the views of the many great men whose doctrines you give. With

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<sup>1</sup> *Origin of Species*, 6th ed., p. 242.

<sup>2</sup> *Ibid.*, p. 171.

the exception of special points I did not even understand H. Spencer's general doctrine. I never in my life read so lucid an expositor (and therefore thinker) as you are ; and I think I understand nearly the whole—perhaps less clearly about Cosmic Theism and Causation than other parts. . . . It pleased me to find that here and there I had arrived from my own crude thoughts at some of the same conclusions with you, though I could seldom or never give my reasons for such conclusions."<sup>1</sup>

It is not without some significance, particularly in an attempt to ascertain Darwin's exact philosophical standpoints, that this letter, mentioning special illumination, was not written until 1874, or eight years before his death, and after the great works of his life had been given to the world. His most mature thought upon psychological matters, or those bordering upon the psychological, is given to us in his work "On the Expression of the Emotions in Man and Animals." The earliest notes for this are dated 1838 ; the questionnaires from which he obtained much valuable information were sent out in 1867 ; but the book itself was not begun until Jan., 1871, the rough copy being finished in April of the same year.<sup>2</sup> It was published in 1873, *or one year before the Fiske letter !*

Final causes of things—ultimate realities—seem never to have troubled Darwin ; doubtless they did not even come upon his horizon. On these subjects he held essentially the common sense views of the every-day man. He assumed out of hand that it was better to be an ape than an insect ; that it was better to be a man than an ape ; that it was better to be a white man than a Hottentot, and that it was better to be a civilized white man than a barbarian ; and *progress* meant for him a movement in the direction of the civilized white man, with all that that entailed of intellectual and moral attainment, and not a movement in the direction of the insect. In the "Origin of Species" he writes :

"The degree of differentiation and specialization of the parts in organic beings, when arrived at maturity, is the best standard, as yet suggested, of their degree of perfection or highness. We have also seen that, as the specialization of parts is an advantage to each being, so natural selection will tend to render the organization of each being more specialized and perfect, and in this sense higher ; not but that it may leave many creatures with simple and unimproved structures fitted for simple conditions of life, and in some cases will even degrade or simplify the organization, yet leaving such degraded beings better fitted for their new walks of life."<sup>3</sup>

<sup>1</sup> *Life and Letters*, Vol. II, p. 371.

<sup>2</sup> *Ibid.*, Vol. II, p. 313.

<sup>3</sup> *Origin of Species*, p. 363.

His common sense view is again shown in his remarks on beauty.

"We can to a certain extent understand how it is that there is so much beauty throughout nature; for this may be largely attributed to the agency of selection. That beauty, according to our sense of it, is not universal, must be admitted by every one who will look at some venomous snakes, at some fishes, and at certain hideous bats with a distorted resemblance to the human face."<sup>1</sup>

When, in 1859, Huxley spoke of Darwin as in the "front rank of British philosophers,"<sup>2</sup> we are to understand the term as then used to mean what is now generally called man of science rather than metaphysician. Much of Darwin's philosophical reading and thinking was evidently done late in life, if we may judge from his letters and the books he especially refers to in his later works, many of which were not published until the sixties and seventies; yet a very large part of his work was distinctly philosophical, *i. e.*, dealt with ultimate causal relations of phenomena and their laws, and one, at least, of his books may justly be regarded as a contribution to psychology. The problem before us now—Darwin's Idea of Mental Development—is biological in only the widest sense of the term.

In order to determine what his philosophical creed was, to see the conclusions he reached concerning consciousness and its place in a world-plan, it will be, perhaps, necessary to sum up the important questions presented by an evolutionary view of mind, and discover how far he had both formulated and answered them. They are as follows:

I. Does mind come into the causal series of organic evolution at large? Is it actively concerned in progress, *i. e.*, has it a "survival value?"

II. If Darwin answers this question affirmatively, how does he define "mind?"

III. What is the relation of body, and, more particularly, of brain to mind?

IV. What evolves in "mental evolution,"—mind, body, or both mind and body? If mind only, how can it influence organic evolution? If body only, how does its evolution carry with it the evolution of mind? If both, what is the course of "mental evolution?"

To these questions I shall endeavor to find answers in Darwin's own words, or (where he has left us no definite statements as to his views) give what he appears to have tacitly assumed or understood.

<sup>1</sup> *Origin of Species*, p. 488.

<sup>2</sup> T. H. Huxley: *Darwiniana*; *Essays*, 1894, p. 14.

CHAPTER I.

Does mind come into the causal series of organic evolution at large; is it actively concerned in progress, *i. e.*, has it a "survival value?"

To each clause of this question Darwin answers emphatically: "Yes." It is noteworthy, however, that he nowhere formulates, in definite terms, the problem of mind in the causal series of organic evolution, as distinct from the problems of mind's activity in progress and "survival value." What he had to say of mind in the one connection is inextricably interwoven with what he said of it in the others.

The story can be largely told in his own words, and is contained almost entirely in the "Descent of Man."

"Of the high importance of the intellectual faculties, there can be no doubt, for man mainly owes to them his predominant position in the world. We can see, that in the rudest state of society, the individuals who were the most sagacious, who invented and used the best weapons or traps, and who were best able to defend themselves, would rear the greatest number of offspring. The tribes which included the largest number of men thus endowed, would increase in number and supplant other tribes. Numbers depend primarily on the means of subsistence, and this depends partly on the physical nature of the country, but in a much higher degree on the arts which are there practised. . . . All that we know about savages, or may infer from their traditions . . . show that from remotest times successful tribes have supplanted other tribes, . . . and they succeed mainly, though not exclusively, through their arts, which are products of the intellect. It is, therefore, highly probable that with mankind the intellectual faculties have been mainly and gradually perfected through natural selection. . . . Now, if some one man in a tribe, more sagacious than the others, invented a new snare or weapon, or other means of attack or defence, the plainest self interest, without the assistance of much reasoning power, would prompt the other members to imitate him, and all would thus profit. . . . If the new invention were an important one the tribe would increase in number, spread and supplant other tribes."<sup>1</sup>

"Man, in the rudest state in which he now exists, is the most dominant animal that has ever appeared on this earth. He has spread more widely than any other highly organized form; and all others have yielded before him. *He manifestly owes this immense superiority to his intellectual faculties*, to his social habits, which lead him to aid and defend his fellows, and to his corporal structure. *The supreme importance of these characters has been proved by the final arbitrament of the battle for life.* Through his powers of intellect, articulate language has been evolved; and on this his wonderful advancement has mainly depended. As Mr. Chauncey Wright remarks, 'a psychological analysis of the faculty of language shows, that even the smallest proficiency in it might require more brain

<sup>1</sup> *Descent*, new ed., pp. 128-9.

power than the greatest proficiency in any other direction.' He has invented and is able to use various weapons, tools, traps, etc., with which he defends himself, kills or catches prey, and otherwise obtains food. He has made rafts or canoes for fishing or crossing over to neighboring fertile islands. He has discovered the art of making fire, by which hard and stringy roots can be rendered digestible, and poisonous roots or herbs innocuous. This discovery of fire, probably the greatest ever made by man, excepting language, dates from before the dawn of history. These several inventions, by which man in the rudest state has become so pre-eminent, are the direct results of the development of his powers of observation, memory, curiosity, imagination and reason. I cannot therefore understand how it is that Mr. Wallace maintains, that 'natural selection could only have endowed the savage with a brain a little superior to that of an ape.'"<sup>1</sup>

" . . . . The intellect must have been all-important to him even at a very remote period, as enabling him to invent and use language, to make weapons, tools, traps, etc., whereby with the aid of his social habits he long ago became the most dominant of all living creatures."<sup>2</sup> . . . . "But mere bodily strength and size would do little for victory, unless associated with courage, perseverance and determined energy."<sup>3</sup>

In a letter to Lyell we find these words: "I can see no difficulty in the most intellectual individuals of a species being continually selected; . . . the less intellectual races being exterminated."<sup>4</sup>

And compare the following :

"Obscure as is the problem of the advance of civilization, we can at least see that a nation which produced during a lengthened period the greatest number of highly intellectual, energetic, brave, patriotic and benevolent men, would generally prevail over less favored nations."<sup>5</sup>

In another letter, also to Lyell, he answers a case which seems at first sight contrary to his theories, *i. e.*, the stagnation and retrogression of the Greeks after having very high intellectual attainments.

"Thinking over . . . . the high state of intellectual development of the old Grecians with little or no subsequent improvement, being an apparent difficulty, it has just occurred to me that in fact the case harmonizes perfectly with our views. . . . For in a state of anarchy, or despotism, or bad government, or after irruption of barbarism, force, strength or ferocity and not intellect would be apt to gain the day."<sup>6</sup>

In the passage which follows, Darwin carries to its logical conclusion his view of the importance of mind to progress.

<sup>1</sup> *Descent*, pp. 48-49. Italics mine.

<sup>2</sup> *Ibid.*, pp. 609-10.

<sup>3</sup> *Ibid.*, p. 564.

<sup>4</sup> *Life and Letters*, Vol. II, p. 7.

<sup>5</sup> *Descent*, p. 142.

<sup>6</sup> *Life and Letters*, Vol. II, pp. 88-9.

Not only does the individual mind serve the individual man in the struggle for existence, but the collective mind in a community is a necessity for common progress. He writes :

"The presence of a body of well instructed men, who have not to labor for their daily bread, is important to a degree which cannot be overestimated ; as all high intellectual work is carried on by them, and on such work material progress of all kinds mainly depends, not to mention other and higher advantages. . . . If in each grade of society the members were divided into two equal bodies, the one including the intellectually superior and the other the inferior, there can be little doubt that the former would succeed best in all occupations and rear the greater number of children."<sup>1</sup>

The above quotations state clearly and fairly Darwin's case with regard to man ; but he held emphatically that mind in animals was, though in a less degree, still in the same relation to evolution as mind in man.

"In all changes," he tells us, "whether from persecution or convenience, intelligence must come into play in some degree. The kitty-wren (*I. vulgaris*), which builds in various situations, usually makes its nest to match with surrounding objects, but this is perhaps instinct."<sup>2</sup>

"Mr. Swinhoe attributes the victory of the common rat [in the struggle for existence] over the large *Mus conniga*, to its superior cunning."<sup>3</sup>

"The social instinct is indispensable to some animals, useful to still more, and apparently only pleasant to some few animals."<sup>4</sup>

"With those animals which were benefited by living in close association, the individuals which took pleasure in society would best escape various dangers ; whilst those that cared least for their comrades and lived solitary would perish in greater numbers."<sup>5</sup>

Particularly in his treatment of the evolution of the lower animals does he make a strong case for mind, stated under a quite new aspect. This is his work on "Sexual Selection ;" for he makes sexual selection from first to last a psychical phenomenon, in the plainest sense of the word. Sexual selection means above all *choice*, and implies the feelings of love, jealousy, pleasure, disgust and dislike, to say nothing of the more distinctly intellectual attainments of observation and discrimination. In dealing with this, Darwin is everywhere explicit. He says, for instance :

"Sexual selection . . . has played an important part in the history of the organic world."<sup>6</sup> "Secondary sexual characters . . .

<sup>1</sup> *Descent*, pp. 135-6 ; cf. the very definite statement on p. 49, and the parallel passages on pp. 93 and 617.

<sup>2</sup> Posthumous Essay on *Instinct*, in G. J. Romanes's *Mental Evolution in Animals*, p. 370.

<sup>3</sup> *Descent*, p. 80.

<sup>4</sup> *Instinct*, p. 381.

<sup>5</sup> *Descent*, p. 105.

<sup>6</sup> *Ibid.*, p. 613.

in the higher classes have been acquired through sexual selection, which depends on the will, desire and choice of either sex."<sup>1</sup> "As far as can be trusted, the conclusion is interesting that sexual selection, together with equal or nearly equal inheritance by both sexes, has indirectly determined the manner of nidification of whole groups of birds."<sup>2</sup>

In this last passage he declares that habit is indirectly determined, for a group of birds, by the *same agency*—sexual selection—which determines structure. It must be observed, however, that sexual selection cannot occur until some degree of intelligence has already been reached in the animal world. In a letter to F. Müller (Feb. 22, [1869?]), we find this :

"But what I want to know is, how low in the scale sexual differences occur which require some degree of self-consciousness in the males, as weapons by which they fight for the females, or ornaments which attract the opposite sex."<sup>3</sup>

Enough has now been quoted to show that Darwin returns an emphatic affirmative to the questions whether or not mind comes into the causal series of organic evolution at large, is actively concerned in progress, and has a survival value. We must now turn to our second question, and see what Darwin understood the term *mind* to cover.

## CHAPTER II.

Unfortunately, we have to note, at the beginning of this Chapter, that Darwin failed to define his terms, and nowhere tells us in so many words what he meant to imply by "mind." After using the word for nearly a life-time, he remarks at the end of his work on *Emotions*,<sup>4</sup> which was distinctly a contribution to psychology: "I have often felt much difficulty about the proper application of the terms, will, consciousness, and intention. Actions which were at first voluntary soon become habitual, and at last hereditary, and may then be performed even in opposition to the will."<sup>5</sup>

I propose here to give, briefly, what appear to have been his views, and to support my statements by the quotations which seem to prove my conclusions.

If a ball be struck, it will change its position, and move in the direction of the blow; if a piece of ice be laid on a hot surface, it will change its form and condition, and melt; if a drop of acid be placed upon the skin of a brainless frog, a leg is moved toward the acid which is, if possible, wiped away.

<sup>1</sup> *Descent*, p. 260.

<sup>2</sup> *Ibid.*, p. 456.

<sup>3</sup> *Life and Letters*, Vol. II, p. 293.

<sup>4</sup> This work was written about 8 years before his death.

<sup>5</sup> *Emotions*, p. 357.



None of these actions are supposed to be accompanied by consciousness. Now I think that Darwin held distinctly that the movement of the leg of a brainless frog in response to the acid is of quite a different kind from the movement of the struck ball or melting ice; *it belongs to an entirely different category of phenomena from the phenomena of the merely mechanical causal series.* This is a statement somewhat difficult of proof; but the following sentence seems at least some small evidence in its favor.

"Reflex actions, in the strict sense of the term, are due to the excitement of a peripheral nerve, which transmits its influence to certain nerve-cells, and there in their turn excite certain muscles or glands into action; and all this may take place without any sensation or consciousness on our part, though often thus accompanied."<sup>1</sup>

It is in reflex action, even though it "takes place without any sensation or consciousness," that we find the beginning of that *something* which later is called mind. Not that Darwin held that mind developed out of, or up from, reflex action, for I think the following passage shows that he did not:

"It is scarcely credible that the movements of a headless frog, when it wipes off a drop of acid or other object from its thigh, and which movements are so well co-ordinated for a special purpose, were not at first performed voluntarily, being afterwards rendered easy through long-continued habit so as, at last, to be performed unconsciously, or independently of the cerebral hemispheres."<sup>2</sup>

but reflex action seems to be the line of demarcation between the world of living matter and the world of dead, and is in some way *other than* the physical forces proper.

Higher than reflex action is instinct, and above instinct comes intelligence. Whether Darwin would have applied the term "mind" unconditionally to instinct is difficult to state, but from the general drift of his whole work it seems to me that, though he distinguished rather sharply between intelligence and instinct, he still held instinct to be in some way mind. Certainly he nowhere says it is not mind, even when he writes: "The very essence of an instinct is that it is followed independently of the reason."<sup>3</sup> The following may make this clear:

"Water-hens and swans, which build in or near the water, will instinctively raise their nests as soon as they perceive the water begin to rise."<sup>4</sup>

He goes on to cite many cases of birds apparently choosing, selecting, and acting from habit and inheritance. He did not

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<sup>1</sup> *Emotions*, p. 35.

<sup>2</sup> *Ibid.*, p. 40.

<sup>3</sup> *Descent*, p. 122.

<sup>4</sup> *Instinct*, p. 370.

think that intelligence was developed from instinct, for he says in a letter to Asa Gray, of April, 1860:

"The reviewer takes a strange view of *instinct*: he seems to regard intelligence as a developed instinct, which I believe to be wholly false. I suspect he has never much attended to instinct and the minds of animals, except by reading."<sup>1</sup>

That animals had intelligence as well as instinct he firmly believed, though he did not consider the scope very wide, for he says quite emphatically (also in a letter to Gray): "The coolness with which he [Bowen] makes all animals to be destitute of reason is simply absurd."<sup>2</sup> (Nov. 26, 1860.)

And again, "only a few persons now dispute that animals possess some power of reasoning. Animals may constantly be seen to pause, deliberate and resolve."<sup>3</sup>

Regarding the mind of man he held simply that we have here a culmination,—a flowering,—for the whole series of organic species, but not something which differs in essence from the mind of the lower orders.

"The mental faculties of man and the lower animals do not differ in kind, though immensely in degree."<sup>4</sup> "The fact that the lower animals are excited by the same emotions as ourselves is so well established, that it will not be necessary to weary the reader with many details."<sup>5</sup> "As man possesses the same senses as the lower animals his fundamental intuitions must be the same."<sup>6</sup>

To the "high mental powers" of "abstraction, general conception, self-consciousness, mental individuality," he devotes a little over one page in the "Descent of Man." Here, if anywhere in his work, he shows how really little the meaning and value of his psychological terms had appealed to him. For instance, he attributes abstract ideas to some animals, and tells us that "when a dog sees another dog at a distance it is often clear that he perceives that it is a dog in the abstract [!]; for when he gets nearer his whole manner suddenly changes if the other dog be a friend."<sup>7</sup>

As I am to take up the development of instinct later, it will be enough here, in summing up this Chapter, to say that in a broad sense *mind* is used to cover all those attributes or powers of living beings, reasoning, abstraction, attention, self-consciousness, etc., which might be called "intelligence," and those actions and feelings which might be spoken of as "instinctive." These two, together with reflex action, Darwin included in a

<sup>1</sup> *Life and Letters*, Vol. II, p. 99.

<sup>2</sup> *Ibid.*, Vol. II, p. 146.

<sup>3</sup> *Descent*, p. 75.

<sup>4</sup> *Ibid.*, p. 147.

<sup>5</sup> *Ibid.*, p. 69.

<sup>6</sup> *Ibid.*, p. 66.

<sup>7</sup> *Ibid.*, p. 83.

vague, unnamed, undefined group of manifestations differing essentially from the actions and reactions of the inorganic world. He treated intelligence, instinct and reflex action as phenomena of the same general kind, and showed that they were genetically related and subject to the same evolutionary laws. It is my belief that he applied the term mind, or would have applied it had he given attention to his meanings and definitions in psychology, to every manifestation occurring in living matter to which any, even the most rudimentary form of consciousness could be ascribed, whether the animal manifesting it were a single cell or a complex organism; but that in general, he restricted it to what are called the "higher" mental faculties. In other words, he simply adopted the popular view of mind.

### CHAPTER III.

A difficulty strikes us at the very outset of our inquiry into the relation of brain and mind, for Darwin used the two words almost interchangeably. He summed up his views when speaking of the change which came to him in his later life, through the loss of his aesthetic interests. He says :

"My mind seems to have become a kind of machine for grinding general laws out of large collections of facts, but why this should have caused the atrophy of that part of the brain alone on which the higher tastes depend, I cannot conceive. A man with a mind more highly organized or better constituted than mine would not, I suppose, have thus suffered, and if I had to live my life over again I would have made a rule to read some poetry and listen to some music at least once every week; for perhaps the parts of my brain now atrophied would thus have been kept alive through use."<sup>1</sup>

The discovery of the exact views held by Darwin on the relation of mind and brain is a task by no means easy. We have to remember that he never came to close quarters with his problem. That brain is the physical substrate of mind, and a particular brain of a particular mind, he never probably doubted, or even conceived the possibility of its being otherwise; but just what the relation of mind and brain implies, how it is effected, seems to have been equally remote to him. It strikes one with astonishment, in the midst of one's admiration for his stupendous tasks, his infinite care and his devotion to detail, to find this simplicity of view amounting almost to shallowness with regard to one of his fundamental problems,—a problem whose data he was continually collecting and collating, yet whose essence he seems to have missed to the last.

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<sup>1</sup> *Life and Letters*, Vol. I, pp. 81-82.

In his work on the "Expression of the Emotions" he devotes one of his longest, and in some ways, most critical chapters to *Blushing*, and gives a special section entitled, "The Nature of the Mental States which Induce Blushing."<sup>1</sup>

"These consist of shyness, shame and modesty; the essential element in all being self-attention. Many reasons can be assigned for believing that originally self-attention directed to personal appearance in relation to the opinion of others was the exciting cause."

Then follow several pages of citations, and then the following :

"Finally, then, I conclude that blushing—whether due to shyness—to shame for real crime—to shame from a breach of the laws of etiquette—to modesty from humility—to modesty from indelicacy—depends in all cases on the same principle; this principle being a sensitive regard for the opinion, more particularly for the depreciation of others, primarily in relation to our personal appearance, especially of our faces; and secondarily, through the force of association and habit, in relation to the opinion of others on our conduct."<sup>2</sup>

Notice that he has given strictly psychological causes of blushing. His theory of it, somewhat condensed, I give in his own words; in it he sets forth, as clearly as anywhere in his works, his ideas on the relation of body and mind.

"The hypothesis which appears to me most probable, though it may at first seem rash, is that attention closely directed to any part of the body tends to interfere with the ordinary and tonic contraction of the small arteries of that part. These vessels, in consequence, become at such times more or less relaxed, and are instantly filled with arterial blood. This tendency will have been much strengthened, if frequent attention has been paid during many generations to the same part, owing to nerve-force readily flowing along accustomed channels, and by the power of inheritance. Whenever we believe that others are depreciating or even considering our personal appearance, our attention is vividly directed to the outer and visible parts of our bodies; and of all such parts we are most sensitive about our faces, as no doubt has been the case during many past generations. Therefore, assuming for the moment that the capillary vessels can be acted on by close attention, those of the face will have become eminently susceptible. Through the force of association the same effects will tend to follow whenever we think that others are considering or censuring our action or character. As the basis of this theory rests on mental attention having some power to influence the capillary circulation, it will be necessary to give a considerable body of details bearing more or less directly on the subject. Several observers [a note gives the authorities], who from their wide experience and knowledge are eminently capable of forming a sound judgment, are convinced that attention or consciousness (which latter term Sir H. Holland thinks the more explicit) concentrated on almost any part of the body produces some direct physical effect on it. This applies to the movements of the involuntary muscles, and of the voluntary

<sup>1</sup> *Emotions*, p. 326.

<sup>2</sup> *Ibid.*, p. 337.

muscles when acting involuntarily,—to the secretion of the glands,—to the activity of the senses and sensations,—and even to the nutrition of parts. [Then follow some cases which I omit.] Certain glands are much influenced by thinking of them, or of the conditions under which they have been habitually excited. This is familiar to every one in the increased flow of saliva, when the thought, for instance, of intensely acid fruit is kept before the mind. . . . We thus see that close attention certainly affects various parts and organs, which are not properly under the control of the will. By what means attention—perhaps the most wonderful of all the wondrous powers of the mind—is affected, is an extremely obscure subject. According to Müller (*Elements of Physiology*) the process by which the sensory cells of the brain are rendered, through the will, susceptible of receiving more intense and distinct impressions, is closely analogous to that by which the motor cells are excited to send nerve force to the voluntary muscles. . . . The manner in which the mind affects the vaso-motor system may be conceived in the following manner: When we actually taste sour fruit, an impression is sent through the gustatory nerves to a certain part of the sensorium; this transmits nerve force to the vaso-motor center, which consequently allows the muscular coats of the small arteries that permeate the salivary glands to relax. Hence more blood flows into the glands, and they secrete a copious supply of saliva. Now it does not seem an improbable assumption, that, when we reflect intently on a sensation, the same part of the sensorium, or a closely connected part of it, is brought into a state of activity, in the same manner as when we actually perceive the sensation. If so, the same cells in the brain will be excited, though perhaps in a less degree, by vividly thinking about a sour taste, as by perceiving it; and they will transmit in the one case as in the other nerve force to the vaso-motor center with the same results. . . . Now as men during endless generations have had their attention often and earnestly directed to their personal appearance, and especially to their faces, any incipient tendency in the facial capillaries to be thus affected will have become in the course of time greatly strengthened through the principles just referred to, namely: nerve force passing readily along accustomed channels, and inherited habit. Thus, as it appears to me, a plausible explanation is afforded of the leading phenomena connected with the act of blushing.”<sup>1</sup>

I may pause here a moment to point out a concrete illustration of what I have called Darwin's simplicity of view almost amounting to shallowness; in this work he constantly uses (I believe for the first time, for I have failed to notice even one instance of it in his earlier works) the term “nerve force.” He speaks of the *undirected flow of nerve force*, and the *undirected overflow of nerve force*;<sup>2</sup> the *steady flow of nerve force*;<sup>3</sup> the *involuntary transmission of nerve force*;<sup>4</sup> *radiation of nerve force*,<sup>5</sup> and a *thrill of nerve force*,<sup>6</sup>—yet nowhere does he make an attempt to tell us what this nerve force is, how it is related

<sup>1</sup> *Emotions*, pp. 337-344.

<sup>2</sup> *Ibid.*, pp. 32 and 349.

<sup>3</sup> *Ibid.*, p. 71.

<sup>4</sup> *Ibid.*, p. 68.

<sup>5</sup> *Ibid.*, p. 41.

<sup>6</sup> *Ibid.*, p. 197.

to or compares with other known physical forces ; how it " flows," " overflows," " radiates " and " thrills," and, above all, what is its significance for consciousness. That it had significance for consciousness to his mind, will, I think, be evident from the context of two or three of the phrases quoted :

" The frantic and senseless actions of an enraged man may be attributed in part to the undirected flow of nerve force, and in part to the effects of habit."<sup>1</sup>

" This involuntary transmission of nerve force may or may not be accompanied by consciousness. Why the irritation of a nerve cell should generate or liberate nerve force is not known, but that this is the case seems to be the conclusion arrived at by all the greatest physiologists."<sup>2</sup>

" On the other hand many of the effects due to the excitement of the nervous system seem quite independent of the flow of nerve force along the channels which have been rendered habitual by former exertions of the will ; . . . for instance, the change of color in the hair from extreme terror or grief,—the cold sweat and the trembling of the muscles from fear."<sup>3</sup>

The above quotations bring out the point I made earlier, that Darwin had thought widely but not deeply upon psychological subjects, and that he never came to close quarters with some of his fundamental problems. He gives the facts clearly enough, but makes no attempt to reason them out to their legitimate conclusions. He tells us of nerve force producing action on the vaso-motor center, of undirected nerve force (in part) producing " frantic and senseless actions ; " of an " involuntary transmission of nerve force " accompanied or not accompanied by consciousness ; and last, but not least, of still other effects due to the *nervous system*, but *independent of nerve force*.

It may be urged that Darwin used the terms current in his day, which he obtained from the literature his quotations show him to have been familiar with. This, it seems to me, only emphasizes the fact that his psychology was at best second-hand, and that his contributions to philosophy did not lie in the exposition of the phenomena of consciousness in more than a superficial sense.

If Darwin did not define what he meant by nerve force, still less did he trouble himself with a clear statement of what he considered the exact relation of mind and brain to be. I have already quoted passages from his letters and works to show that he used the terms brain and mind interchangeably ; I add one now, which occurs in the *Descent of Man*, and seems to me to carry more weight than the others :

<sup>1</sup> *Emotions*, p. 349.

<sup>2</sup> *Ibid.*, p. 71.

<sup>3</sup> *Ibid.*, p. 50.

"As soon as the mental faculties had become highly developed, images of all past actions and motives would be incessantly passing through the brain of each individual. . . . As past impressions were compared during their incessant passage through the mind," etc.<sup>1</sup>

In spite of these quotations it is difficult to believe that he considered the brain and mind as one and the same thing,—that the mind *is* the brain,—but I do think that he looked upon the mind as in the brain (he speaks of the "frontal part of the skull" as the seat of intellectual faculties)<sup>2</sup> in some way, and conditioned by it; yet at the same time he speaks of "the increased size of the *brain* from greater intellectual development,"<sup>3</sup>—indicating that the *brain* was, on the other hand, conditioned by the *mind*.

The further manner of the relation of brain and mind was by interaction. The substance of his theory of blushing is that we have a bodily action caused by a mental one, a psychic state causing a physical response. If his explanation leaves anything to be desired in explicitness it is offset by this passage, in which he states that the *mind* affects the heart.

"Hence when the *mind* is strongly excited, we might expect that it would instantly affect, in a direct manner, the heart; and this is universally acknowledged and felt to be the case. Claude Bernard also repeatedly insists, and this deserves special notice, that when the heart is affected it reacts on the *brain*; and the state of the brain again reacts through the pneumo-gastric nerve on the heart; so that under any excitement there will be much mutual action and reaction between these two most important organs of the body."<sup>4</sup>

"So a man may intensely hate another, but until his bodily frame is affected he cannot be said to be enraged."<sup>5</sup>

"He who gives way to violent gestures will increase his rage; he who does not control the signs of fear will experience fear in a greater degree; and he who remains passive when overwhelmed with grief loses his best chance of recovering elasticity of mind. These results follow partly from the intimate relation which exists between almost all the emotions and their outward manifestation; and partly from the direct influence of exertion on the heart, and consequently on the brain. Even the simulation of an emotion tends to arouse it in our minds."<sup>6</sup>

In the first of these quotations he states that *mind* acts on heart, and heart reacts on *brain*; but if we assume that "mind" was meant in the second instance, we can safely say that he commits himself to an interaction theory of mind and body.

<sup>1</sup> *Descent*, pp. 98 and 100.

<sup>2</sup> *Ibid.*, p. 55.

<sup>3</sup> *Ibid.*, p. 197.

<sup>4</sup> *Emotions*, pp. 68-9. Italics mine.

<sup>5</sup> *Ibid.*, p. 240.

<sup>6</sup> *Ibid.*, p. 366.

It is not impossible that he looked upon mind as a function of brain, though there is very little in his works to indicate this. In his book on the Emotions he quotes from Dr. Maudsley's "Body and Mind," in this passage :

"He adds, that as every human brain passes, in the course of its development, through the same stages as those occurring in the lower vertebrate animals, and as the *brain* of an idiot is in an arrested condition, we may presume that it '*will manifest its most primitive functions, and no higher functions.*'"<sup>1</sup>

Still we must not lay too much stress upon this paragraph.

While we are dealing with the views which Darwin held upon the relation of mind and brain, it may not be without interest to note that he never seriously entertained the concept of mind as a *secretion of brain*,—in fact he does not even mention the theory. That it was familiar to him we may justly infer because he quotes frequently from the materialistic literature of the time,—Carl Vogt and others,—in which the subject was either treated or touched upon. The fact that he never thought it worth refuting would seem to indicate that the idea of brain and mind as two distinct yet interacting entities was too firmly grounded in him to admit the consideration of any rival theories. The expression he quotes from Maudsley about "brain manifesting its primitive functions," may have meant no more to him than "manifesting those conditions or states along with which, or under which, consciousness of various kinds occurs".

Taking, then, what he actually said about interaction of brain and mind, and what he failed to say about other theories,—mind as a function or as a secretion of brain,—we may state in answer to the question : How are mind and brain related ? that Darwin postulated *two distinct, interacting interdependent realities, Mind and Brain*.

#### CHAPTER IV.

We come now to the main problem of our inquiry—what Darwin understood by Mental Development. We already have in hand some of our chief material. We have seen that Darwin held mind to be actively concerned in progress and causally related to organic evolution at large ; that by mind he meant not only the higher faculties, but instinct, and that he considered the relation of mind to body to be one of interaction.

It is not in any way within the scope of this paper to show how, given Darwin's data for organic evolution, they would work out under any of the current theories of the relation of

<sup>1</sup> *Emotions*, p. 246. Italics mine.



brain and mind. Of these there are at least five: Interaction, Materialism, Spiritual Monism, Parallelism, and Logical-function Relation. (1) Interaction postulates two distinct beings, or entities, brain and mind, which, however, are related, and act and react upon each other. (2) Materialism assumes mind to be a product or function of the brain. (3) Spiritual Monism holds mind to be the only real, and body some form or product of it. (4) Parallelism regards mind and brain, and the changes of each, as corresponding series of phenomena. (5) Logical-function relation proposes "a relation between two terms (mind and brain), such that *if* the one term alters, *then* the second alters also."

Darwin's views on the causal relation of mind to organic evolution at large, its activity in progress, and its survival value, committed him to an interaction theory of mind and body for the particular organism; and he was thus, in a way, bound to a concept of mental development logically the outcome of these ideas. We should thus expect to find—and in fact we do find—that he regarded mental development as a *progressive series of mutual interdependencies* of mind and body, both for evolution at large and for the individual in particular.

Darwin never believed that materialism had said, or could say, the final word in the universe, and, consequently, never held that it could be the ultimate appeal in organic evolution. He was thus debarred from holding an opinion upon either the relation of mind to body at a given moment in time, or their relation through a series of moments, or indefinite time, which would cause mind to be solely and completely conditioned by matter, or, in other words, by its physical substrate, the brain.

Before trying to show what Darwin considered the developmental relation of the mental-bodily series to be, it will, perhaps, be best to give a short outline of his views on the evolution of one of the pair—the mental. Scattered through his books are numerous passages from which we may determine his general views, and, in particular, we have the posthumous essay on Instinct, intended once for the "Origin of Species," but omitted on account of its length and published finally in Romanes's work on "Mental Development." From these it is certain that Darwin held *mind to be subject to the same laws as body*. He tells us very little about mind in the sense of *intelligence*, but confines himself almost entirely to *instinct*.

I wish to show, in what follows, how he considered Instinct to have been governed and developed by the laws of variation, inheritance and natural selection,—the same laws by which the bodily structure of an organism is determined.

In one of his letters he says: "In my fuller MS. [probably

this posthumous essay] I have discussed a good many instincts, but there will surely be more unfilled gaps here than with corporeal structure, for we have no fossil instincts and I know scarcely any except of European animals."<sup>1</sup>

If there were no "fossil instincts," he nevertheless "found some traces of a graduate series in instincts,"<sup>2</sup> which served a somewhat similar purpose ; his chief emphasis is, however, on its survival value.

"An instinct, if really of no considerable importance in the struggle for life, could not be modified or formed through natural selection."<sup>3</sup>

"Instinct is for the preservation of the animal. . . . There is no valid reason why it should not have been acquired through natural selection, like corporeal structures used only on one occasion."<sup>4</sup>

"A complex instinct might have been acquired by successive steps and which, moreover, generally indicate according to our theory, the actual steps by which the instinct has been acquired, inasmuch as we suppose allied instincts to have branched off at different stages of descent from a common ancestor and therefore to have remained more or less unaltered, the instincts of the several lineal ancestral forms of any one species ; bearing all this in mind, together with the certainty that instincts are as important to an animal as their generally correlated structures, and that in the struggle for life under changing conditions, slight modifications of instinct could hardly fail occasionally to be profitable to individuals, I can see no overwhelming difficulty in our theory."<sup>5</sup>

In another place he says: "He who admits on general grounds that the structure and habits of all animals have been gradually evolved, will look at the whole subject of Expression in a new and interesting light."<sup>6</sup>

Darwin even went so far as to speak of two instincts as struggling together, and in a letter of October, 1874, gives as an instance some of his early observations of ants which carried empty cocoons from a nest to the top of a tree, which he interpreted as a struggle of the instinct to remove an empty cocoon with the instinct to carry a cocoon. His words are: "One instinct [is] in contest with another and mistaken one."<sup>7</sup> By this he evidently means the struggle of two instincts in the community, but not in the same individual; for some of the ants carried the empty cocoons up from the nest, and others, seeing these, carried them to a tree. He gives a more generalized case when he says: "There is a constant struggle

<sup>1</sup> *Life and Letters*, Vol. II, p. 34.

<sup>2</sup> *Instinct*, p. 378.

<sup>3</sup> *Ibid.*, p. 378.

<sup>4</sup> *Ibid.*, p. 377.

<sup>5</sup> *Ibid.*, p. 330.

<sup>6</sup> *Emotions*, p. 12.

<sup>7</sup> *Life and Letters*, Vol. II, p. 370.

going on throughout nature between the instinct of the one to escape its enemy and of the other to capture its prey."<sup>1</sup>

Perhaps the best short statement of his views is contained in one of his letters:

"Every one" (it reads) "who believes as I do that all *the corporeal and mental organs* (excepting those which are neither advantageous nor disadvantageous to the possessor) of all beings have been *developed through natural selection*, or the survival of the fittest together with use or habit, will admit that these organs have been formed so that their possessors may compete successfully with other beings and thus increase in number. Now an animal may be led to pursue that course of action which is most beneficial to the species by suffering, such as pain, hunger, thirst and fear; or by pleasure, as in eating and drinking and in the propagation of the species, or by both means combined, as in the search for food. . . . Hence, it has come to pass, that most or all sentient beings have been developed in such a manner, through natural selection, that pleasurable sensations serve as their habitual guides."<sup>2</sup>

Upon variation and inheritance he has much less to say than of the survival value of instinct; in one place he speaks of "*spontaneous variations* of instincts"<sup>3</sup>—a term which he commonly used in referring to structures; and a great many times he tells of changes in instinct. In another place he says: "I have endeavored in this chapter briefly to show that the mental qualities of our domestic animals vary and that the variations are inherited."<sup>4</sup> Darwin seems to have had no doubt whatever upon the inheritability of something which *makes for*—if it be not yet—instinctive action.

"But in this case it is mental aptitude quite as much as bodily structure which appears to be inherited."<sup>5</sup> "Gratiolet appears to overlook inherited habit."<sup>6</sup> "Inherited like the tendency of a bulldog to pin the nose of a bull."<sup>7</sup> "It further deserves notice that reflex actions are in all probability liable to slight variations, as are all corporeal structures and instincts, and any variations which would tend to be preserved and inherited. Thus reflex actions, when once gained for one purpose, might afterwards be modified independently of the will or habit, so as to serve some distinct purpose. Such cases would be parallel with those which, as we have every reason to believe, have occurred with many instincts; for although some instincts have been developed simply through long-continued and inherited habit, other highly complex ones have been developed through the preservation of variations of pre-existing instincts—that is through natural selection."<sup>8</sup>

Had Darwin said nothing more than the passages quoted,

<sup>1</sup> *Instinct*, p. 380.

<sup>2</sup> *Life and Letters*, Vol I, p. 280. Italics mine.

<sup>3</sup> *Origin*, p. 244.

<sup>4</sup> *Ibid.*, p. 275.

<sup>5</sup> *Descent*, p. 33.

<sup>6</sup> *Emotions*, p. 6.

<sup>7</sup> *Life and Letters*, Vol. II, p. 421.

<sup>8</sup> *Emotions*, p. 41.

his view of the continuity of the same laws through both structural and mental development would have been clear: but in this closing paragraph of his essay on "Instinct" he makes a statement which leaves us no doubt whatever :

"It may not be logical, but to imagination it is far more satisfactory to look at the young cuckoo ejecting its foster brothers, ants making slaves, the larvæ of the Ichneumidæ feeding within the live bodies of their prey, cats playing with mice, otters and cormorants with living fish, not as instincts specially given by the Creator, but as very small parts of one general law leading to the advancement of all organic bodies—Multiply, Vary, let the strongest live and the weakest Die."<sup>1</sup>

Having seen how mind, or at least instinct, evolves, and that it is ruled by the same laws which govern the "advancement of all organic bodies," we may turn our attention more particularly to the questions which it is the purpose of this Chapter to discuss, and, if possible, to answer.

"What evolves in mental evolution, mind or body?" To this Darwin undoubtedly replied: "*Both evolve.*" I have already shown that he looked upon *mind*, instinct, as evolving, and as being subject to one and the same law of organic development; a concept of mind which might almost imply spiritual monism or identity, but which to him seems to have been proof of interaction. On the other hand, a great part of his life's work was devoted to showing how structure, and consequently brain, evolve; a concept which would imply a conditioning of the psychic life by its physical substrate. That the psychic was in his opinion conditioned by, and to a large extent dependent on the physical, we may show by his own very specific statements.

"Although we learn from the above-mentioned insects, and the beaver, a high degree of intelligence is certainly compatible with complex instincts, and although actions, at first learnt voluntarily, can soon, through habit, be performed with the quickness and certainty of reflex action, yet it is not improbable that there is a certain amount of interference between the development of free intelligence and of instinct,—which latter implies some inherited modification of the brain. Little is known about the functions of the brain, but we can perceive that as the intellectual powers become highly developed, the various parts of the brain must be connected by very intricate channels of the freest intercommunication; and, as a consequence, each separate part would perhaps tend to be less well fitted to answer to particular sensations or associations in a definite and inherited—that is instinctive—manner. There seems even to exist some relation between a low degree of intelligence and a strong tendency to the formation of fixed, though not inherited habits; for, as a sagacious physician remarked to me, persons who are slightly imbecile, tend to act in everything by routine or habit; and they are rendered much happier if this is encouraged."<sup>2</sup>

<sup>1</sup> *Instinct*, p. 384.

<sup>2</sup> *Descent*, p. 68.

And again : "That some physical change is produced in the nerve-cells or nerves which are habitually used can hardly be doubted, for otherwise it is impossible to understand how the tendency to certain acquired movements is inherited."<sup>1</sup>

The passage which I now give, and which might properly have been inserted in the Chapter on "Mind in the Causal Series," leaves no room for doubt as to Darwin's opinion of the dependence of mind upon the development of the brain ; but more than that, it leaves equally no doubt of the dependence of structure—at least in evolution through a series,—upon the "exertion of choice," a purely psychic phenomenon.

"He who admits the principle of *sexual selection* will be led to the remarkable conclusion that the *nervous system not only regulates most of the existing functions of the body, but has indirectly influenced the progressive development of various bodily structures and of certain mental qualities*. Courage, pugnacity, perseverance, strength and size of body, weapons of all kinds, musical organs, both vocal and instrumental, bright colors and ornamental appendages have all been indirectly gained by one sex or the other, through the exertion of choice, the influence of love and jealousy, and the appreciation of the beautiful in sound, color or form ; and these powers of mind manifestly depend on the development of brain."<sup>2</sup>

It may not be out of place to notice that while these words (and others which I have given) indicate an interaction and interdependence in the developmental series, they do not imply a reciprocal action. The powers of mind seem to depend upon the condition of the brain of a particular individual at a particular moment, each change in which subtends a corresponding psychic change ; while on the other hand, the "exertion of choice"—in sexual selection—works no appreciable change upon the particular organism, does not in any way modify its structure, or have application to it in point of time, but operates upon the series as a whole. In other words, mind depends immediately on what brain *is* at a given moment, but structure depends mediately on what mind *has been* at a given moment. Darwin does not state this in so many words, but the conclusion seems obvious from the data given. This does not in any way interfere with the concept of mutual interdependence in development, as the following letter to Lyell (June 6 [1860]) will show :

"I suppose Lowell's difficulty about instinct is the same as Bowen's, but it seems to me wholly to rest on the assumption that instincts cannot graduate as finely as structures. I have stated in my volume that it is hardly possible to know which, *i. e.*, whether instinct, or structure, change first by insensible steps. Probably sometimes instinct, sometimes structure. When a British insect feeds on an exotic plant, instinct has changed by very small steps, and their structures

<sup>1</sup> *Emotions*, p. 29.

<sup>2</sup> *Descent*, p. 617. Italics mine.

might change so as to fully profit by the new food. Or, structure might change first, as the direction of tusks in one variety of Indian elephants, which leads it to attack the tiger in a different manner from other kinds of elephants."<sup>1</sup>

*"As the various mental faculties gradually developed themselves the brain would almost certainly become larger.* No one, I presume, doubts that the *large proportion which the size of man's brain bears to his body is closely connected with his higher mental powers.* We meet with closely analogous facts with insects; for in ants the cerebral ganglia are of extraordinary dimensions, and in all the Hymenoptera these ganglia are many times larger than in the less intelligent orders, such as beetles. On the other hand, no one supposes that intellect of any two animals or of any two men can be accurately gauged by the cubic contents of their skulls. It is certain that there may be extraordinary mental activity with an extremely small absolute mass of nervous matter; thus the wonderfully diversified instincts, mental powers, and affections of ants are notorious, yet their cerebral ganglia are not so large as the quarter of a small pin's head. Under this point of view, the brain of an ant is one of the most marvellous atoms of matter in the world, perhaps more so than the brain of a man.

The belief that there exists in man some close relation between the size of the brain and the development of the intellectual faculties, is supported by the comparison of the skulls of savage and civilized races, of ancient and modern people, and by the analogy of the whole vertebrate series. Dr. J. Barnard Davis has proved, by many careful measurements, that the mean internal capacity of skull of Europeans is 92.3 cubic inches; in Americans 87.5; in Asiatics 87.1; and in Australians only 81.9 cubic inches. Prof. Broca found that the 19th century skulls from graves in Paris were larger than those from vaults of the twelfth century, in the proportion of 1484 to 1426; and that the increased size, as ascertained by measurements, was exclusively in the frontal part of the skull—the seat of the intellectual faculties. Prichard is persuaded that the present inhabitants of Britain have "much more capacious brain cases" than the ancient inhabitants. Nevertheless it must be admitted that some skulls of very high antiquity, such as the famous one of Neanderthal, are well developed and capacious. With respect to the lower animals, M. E. Sartet, by comparing the crania of tertiary and recent mammals belonging to the same groups, has come to the remarkable conclusion that the brain is generally larger and the convolutions are more complex in the more recent forms. On the other hand, I have shown that the brains of domestic rabbits are considerably reduced in bulk, in comparison with those of the wild rabbit or hare; and this may be attributed to their having been closely confined during many generations, so that they have exerted their intellect, instincts, senses and voluntary movements but little.

The gradually increasing weight of the brain and skull in man must have influenced the development of the supporting spinal column, more especially whilst he was becoming erect. As this change of position was being brought about, the internal pressure of the brain will also have influenced the form of the skull; for many facts show how easily the skull is thus affected. . . . Lastly, if any animal were to increase or diminish much in general size, without any change in its mental powers, or if the mental powers were to be much increased or diminished, without any great change in the size of the

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<sup>1</sup> *Life and Letters*, Vol. II, pp. 111, 112.

body, the shape of the skull would almost certainly be altered. . . . From these several facts we can understand, to a certain extent, the means by which the great size and more or less rounded form of the skull have been acquired by man; and these are characters eminently distinctive of him in comparison with the lower animals."<sup>1</sup>

These passages state, it seems to me, with adequate clearness that Darwin considered the development of any brain in the animal series to be closely correlated with the degree of intelligence manifested. Darwin held that not only was there a progressive series of minds, but that those minds had been derived, the one from the other, by the natural processes of inheritance and modification of the total organism, and that a common progenitor for mind was *given with or in* the common progenitor for body. By this means he accounts for the similarity of taste, feeling, emotion, etc., which he notes as existing throughout the animal kingdom.

"To maintain independently of any direct evidence that no animal during the course of ages has progressed in intellect or other mental faculties is to beg the question of the evolution of species. We have seen that according to Sartet, existing mammals belonging to several orders have larger brains than their ancient tertiary prototypes."<sup>2</sup>

"Every one who admits the principle of evolution, and yet feels great difficulty in admitting that female mammals, birds, reptiles and fish, could have acquired the high taste implied by the beauty of the males, and who generally coincide with our own standard, should reflect that the *nerve cells of the brain in the highest as well as in the lowest members of the vertebrate series, are derived from those of the common progenitor of this great kingdom*. For we can thus see how it came to pass that certain mental faculties, in various and widely distinct groups of animals, have been developed in nearly the same manner and to nearly the same degree."<sup>3</sup>

"If no organic being excepting man had possessed any mental power, or if his powers had been of a wholly different nature from those of the lower animals, then we should never have been able to convince ourselves that *our high faculties had been gradually developed*. But it can be shown that there is no fundamental difference of this kind. We must admit that there is a much wider interval in mental power between one of the lowest fishes, as a lamprey or lancelet, and one of the higher apes, than between an ape and a man; yet this interval is filled up by numberless gradations.

Nor is the difference slight in moral disposition between a barbarian, such as the man described by the old navigator Byron, who dashed his child on the rocks for dropping a basket of sea-urchins, and a Howard or Clarkson; and in intellect, between a savage who uses hardly any abstract terms, and a Newton or Shakspeare. Differences of this kind between the highest men of the highest races and the lowest savages are connected by the finest gradations."<sup>4</sup>

"As far as I understand your remarks and illustrations, you doubt

<sup>1</sup> *Descent*, pp. 54-6. Italics mine.

<sup>2</sup> *Ibid.*, p. 81.

<sup>3</sup> *Ibid.*, pp. 616-17. Italics mine.

<sup>4</sup> *Ibid.*, pp. 65-6. Italics mine.

the possibility of gradations of intellectual powers. Now, it seems to me, looking to existing animals alone, that we have a very fine gradation in the intellectual powers of the Vertebrata, with one rather wide gap (not half so wide as in many cases of corporeal structure) between say a Hottentot and an orang, even if civilized as much mentally as the dog has been from the wolf. I suppose that you do not doubt that the intellectual powers are as important for the welfare of each being as corporeal structure; if so, I can see no difficulty in the most intellectual individuals of a species being continually selected, and the intellect of the new species thus improved, aided probably by effects of inherited mental exercise. I look at this process as now going on with the races of man; *the less intellectual races being exterminated*. . . . If I understand you, the turning point in our difference must be, that you think it impossible that the intellectual powers of a species should be much improved by the continued natural selection of the most intellectual individuals. To show how minds graduate, just reflect how impossible every one has yet found it, to define the difference in mind of man and the lower animals; the latter seem to have the very same attributes in a much lower stage of perfection than the lowest savage. I would give absolutely nothing for the theory of natural selection, if it requires miraculous additions at any one stage of descent."<sup>1</sup>

"Your criticism of the rasping noise made by insects being necessarily rhythmical is very good; but though not made intentionally, it may be pleasing to the females from the nerve cells being nearly similar in function throughout the animal kingdom."<sup>2</sup>

The quotations I have given seem to me sufficient to exhibit and explain the Darwinian Idea of Mental Development. Simply stated, mental development for all the organic species, means a *progressive series of mutual interdependencies*. This idea was the outcome of Darwin's concepts of mind and its changes, and of its relation to brain. Neither mind nor brain evolves alone, hence, neither conditions the other more than it is itself conditioned; but together they make a continuing process, ever more differentiated, more complex; a process, which, taken in its entirety, we recognize and describe as Mental Development, both for the individual and for the race.

#### SUMMARY.

We have seen (1) that Darwin believed that mind is causally related to organic evolution; (2) that by mind he meant the specific manifestations of a living organism and its reactions upon its environment as distinguished from the merely mechanical reactions; (3) that he held the relation of mind and body to be one of interaction and interdependence; and (4) that Mental Development is a progressive differentiation, accompanied by, and causally interrelated with the development of the body. How, then, shall we sum up his position,

<sup>1</sup> Letter to Lyell, in *Life and Letters*, Vol. II, p. 7. Italics mine.

<sup>2</sup> *Life and Letters*, Vol. II, p. 364.



and where, in the history of thought, do his philosophical affinities place him?

There can be little doubt from the foregoing that Darwin held the views taught in the popular psychology of his day, which adhered strictly to Cartesian dualism in its explanation of the relation of mind and body. This psychology held "that the substances of the world are divided into minds and bodies; that minds are not in space, while bodies are extended; that minds obey the laws of thought, and bodies the laws of mechanics; that minds are free, and bodies subject to a blind causality; and that, nevertheless, these different forms of existence are occasionally connected with one another, and can influence each other."<sup>1</sup> All this is a matter of course to the great majority of unphilosophical, educated men.

Cartesianism is a statement of what may be called the static relationship of mind and body: it endeavors to account for a particular mind and a particular body at a particular time. Upon this foundation Darwin now builds a new structure. One group of phenomena had early assumed an immense importance to him,—the phenomena of *inheritance*. The thought of hereditary transmission, perhaps always foremost in his biological studies, had deeply imbued him with the idea of life as expressed in an organic series, as well as in a single form. He saw that living beings were not only maintaining their individual interactions of brain and mind, but that these interactions were changing and progressing,—progressing in a definite direction, moving onward, under the laws of inheritance, from the lower to the higher, from the simpler to the more complex. To the facts of the given moment he added the facts of a period of time; to the laws governing the individual, the laws governing the species; and to the concept of the mere existence of a living being, the concept of the development of that being, and the evolution of the series of which it forms, by inheritance, a causally related link. Darwin's philosophical position may thus be summed up in three words, as *Cartesianism plus Evolution*.

#### APPENDIX.

It may not be without interest, as bearing upon Darwin's views of mental development, to note the psychological literature with which he was evidently familiar and which he quoted, and also some of the important works of the time which he seems not to have known. I select the following titles from the foot-notes of the "Origin of Species," "Descent of Man" and "The Expression of the Emotions in Man and Animals," and include in it a few works which are not strictly psychological, but which seem in place here.

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<sup>1</sup> W. Wundt: *Essays*, p. 130.

*Bibliography of Quoted Psychological References.*

- BAIN, ALEXANDER. The emotions and the will. 3rd Ed., 1844.  
 ——— Mental and moral science. 1868.  
 ——— The senses and the intellect. 2nd Ed., 1864.  
 BATEMAN, FREDERIC. Aphasia. 1870.  
 BELL, SIR CHAS. Anatomy and philosophy of expression. 3rd Ed., 1844.  
 BRAID, JAMES. Magic, hypnotism. 1852.  
 BRODIE, SIR BENJAMIN. Psychological inquiries. 1854.  
 DESPINE, PROSPER. Psychologie naturelle. 1868.  
 GALTON, FRANCIS. Hereditary genius. 1869.  
 HOLLAND, SIR HENRY. Chapters on mental philosophy. 1858.  
 LINDSAY, W. LAUDER. Articles in Jour. of Mental Sci. and Edinburgh Vet. Rev.  
 ——— Madness in animals.  
 MAUDSLEY, HENRY. Body and mind. 1870.  
 ——— Physiology and pathology of mind. 2nd Ed., 1868.  
 MILL, JOHN STUART. System of logic.  
 SPENCER, HERBERT. Essays, scientific, political, speculative. Second series, 1863.  
 ——— Principles of Psychology. 1855.  
 SIDGWICK, HENRY. Essay on pleasure and desire. (In Contemp. Rev. 1872.)  
 STEPHEN, LESLIE. Darwinism and divinity, essays on free-thinking. 1873.  
 VOGT, KARL. Mémoire sur les microcephales. 1867.

It is to be noticed that Darwin quoted from books published as late as 1873, the year of the publication of his last philosophical work, "The Expression of the Emotions." To the following (though very incomplete) list of important works I have failed to find reference throughout his writings, or in his "Life and Letters." These, with the exception of the "Life and Letters," were all published previously to the above date. This omission, from a man so scrupulous in giving his authorities, would appear to mean, either that he did not keep up with the current psychological and philosophical literature, or that, knowing these works, he never found occasion to mention them. The latter assumption, in view of the large use he made of the researches and writings of others in supporting his own views, seems absurd; and we are justified in assuming that Darwin was not familiar with them.

*Bibliography of Psychological Works, published previously to 1873, not quoted by Darwin.*

- BENEKE, F. E. Psychologische Skizzen. 1825-27.  
 BROWN, T. Lectures on the philosophy of the human mind. 1822.  
 CARUS, K. G. Vergleichende Psychologie, oder Geschichte der Seele in der Reihenfolge der Thierwelt. 1866.  
 COMTE, A. Philosophy of the sciences. 1853. G. H. Lewes, trans.  
 COUSIN, V. Elements of psychology. Dr. Caleb S. Henry, trans.  
 DROBISCH, M. W. Empirische Psychologie nach naturwissenschaftlicher Methode. 1842.  
 FECHNER, G. T. Elemente der Psychophysik. 1861.  
 ——— Über die Seelenfrage. 1861.  
 FORTLAGE, K. System der Psychologie als empirischer Wissenschaft, aus der Beobachtung des innern Sinnes. 1855.

- HARTLEY, W. S. The philosophy of the human mind. 1860.
- HORWICZ, A. Psychologische Analysen auf psychologischer Grundlage; ein Versuch zur Neubegründung der Seelenlehre. 1872.
- LOTZE, R. H. Medicinische Psychologie, oder Physiologie der Seele. 1852.
- Mikrokosmos. 1856-64.
- MAINE DE BIRAN, M. F. P. G. Essai sur les fondements de la psychologie. 1859.
- MILL, J. Analysis of the phenomena of the human mind. 1829.
- MURPHY, J. J. Habit and intelligence: laws of life and mind; ill. (evolutionist). 1869.
- RAUE, G. Elements of psychology on the principles of Beneke. Ed. Dressler. 1871. (Practically a trans. of Beneke's "Lehrbuch der Psychologie als Naturwissenschaft.")
- TAINE, H. On intelligence (tr.). 1871.
- WAITZ, TH. Lehrbuch der Psychologie als Naturwissenschaft. 1849.
- WEBER, E. H. Die Lehre vom Tastsinne u. Gemeingefühle auf Versuche gegründet. 1851.
- WUNDT, W. Beiträge zur Theorie der Sinneswahrnehmung. 1862.
- — Neue Leistungen auf dem Gebiete der physiolog. Psychologie. 1867.
- — Vorlesungen über die Menschen u. Thierseele. 1863.